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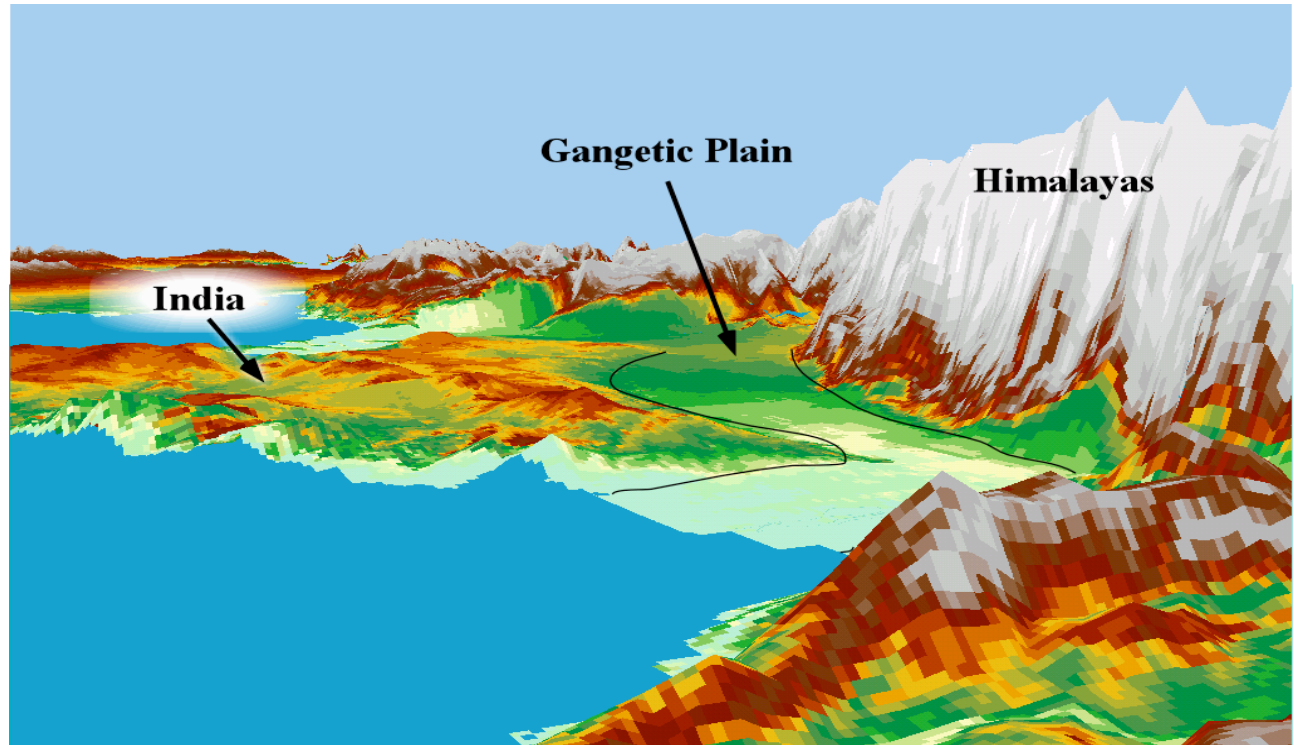


U.S. Department  
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## ***GVAX - Characterizing the Source and Regional scale Transport***



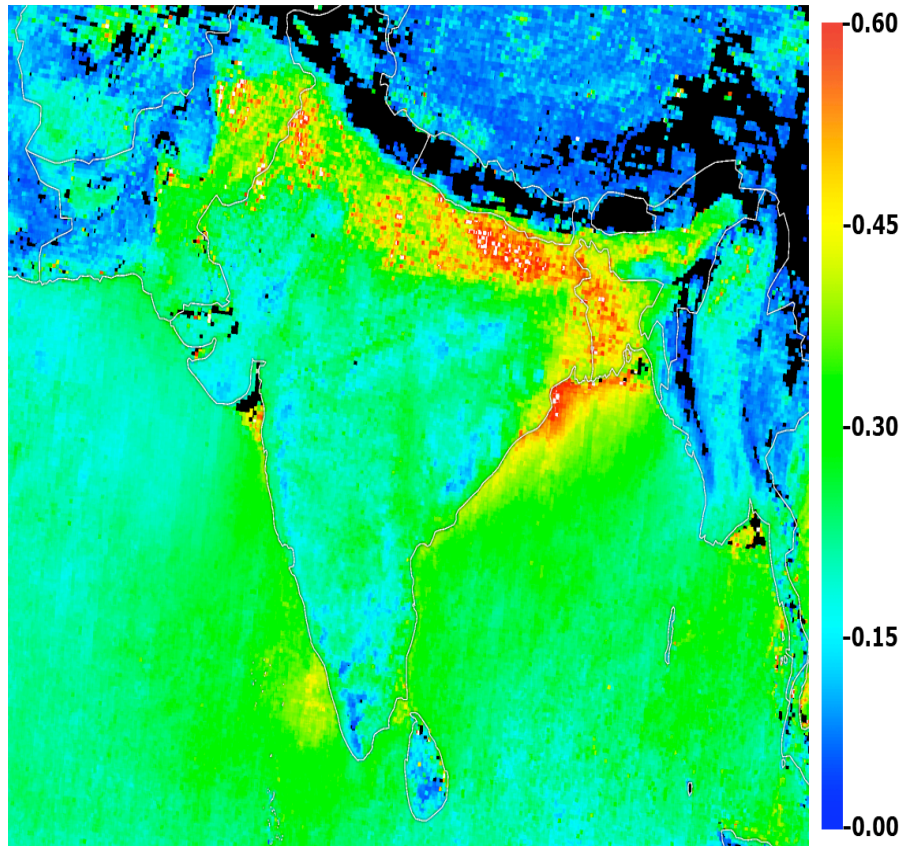
*V. Rao Kotamarthi, Richard Coulter*

*Environmental Science Division*

*Larry DiGirolamo*

*University of Illinois, Urbana-Champaign*

## Motivation

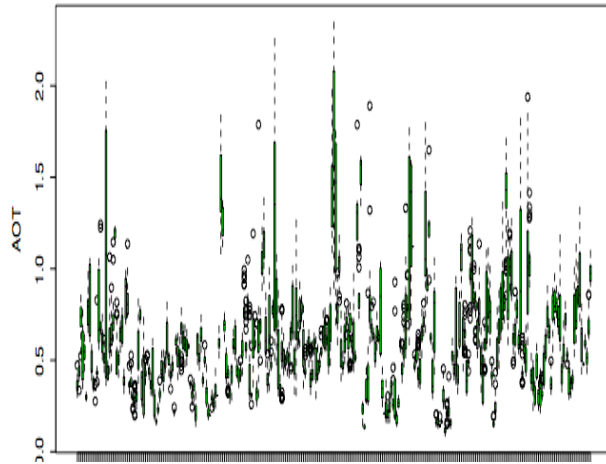


- The upper Ganges valley has some of the highest observed AODs in the MISR data set.
- Though, it covers a vast region extending from the west coast to over the Bay of Bengal during the winter and early summer of each year, the highest AOD's are in the sub Himalayan regions of eastern India.
- The aerosol is unusually high in sulfate, nitrates, organic, black carbon and frequently mineral aerosols.
- Almost all of the aerosols are from anthropogenic activities.
- The aerosol from this region where shown to effect cloud formation and monsoon activity over the Indian ocean during the INDOEX field studies.

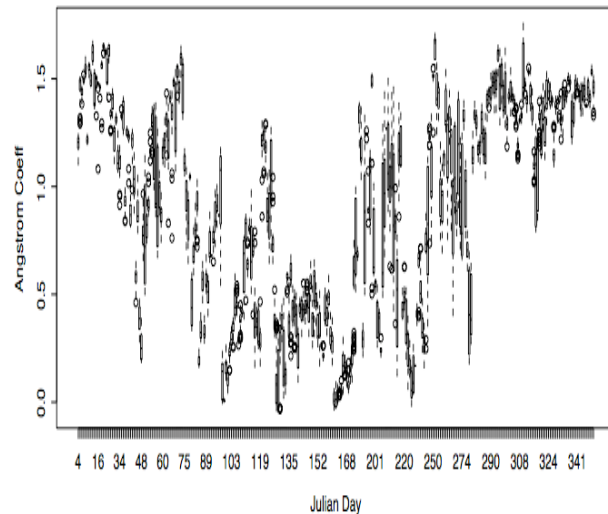
MISR 558 nm AOD Averaged Over  
DJF 2001, 2002, 2003, 2004

# Motivation

Kanpur AERONET data at 500 nm 2005

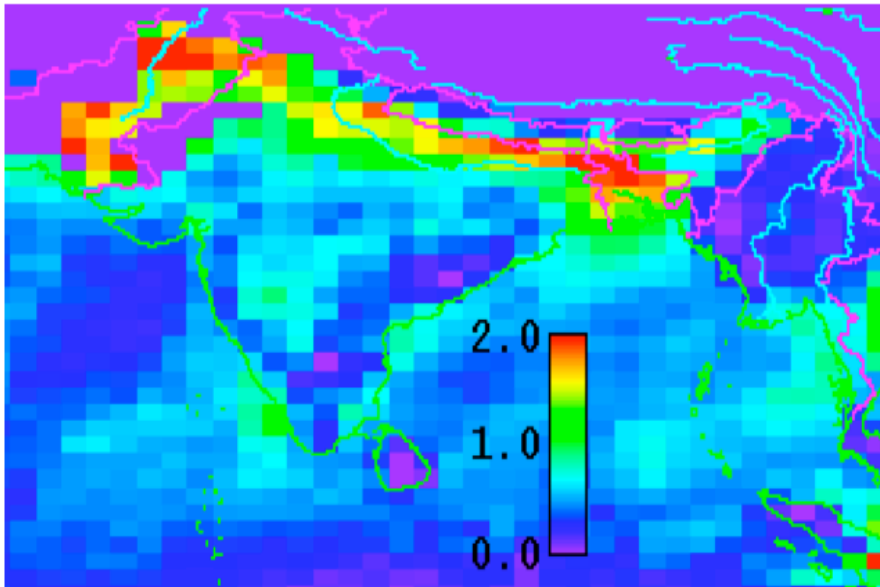


Angstrom Coeff for 2005, 440-870



- There has been no comprehensive study to understand the source, chemistry and transport of these aerosols over the subcontinent of India.
- The longrange viability of the plume is very dependent on the vertical structure of the the aerosol cloud, there is absolutely no significant information on this aspect.
- The complex terrain of this region suggests significant impact of mesoscale flow in affecting the distribution of aerosols. There are no intensive measurements of flow fields during these aerosol episodes.
- There have been several recent publications comparing the MISR data sets with AERONET data collected at Kanpur, india. The correlation was shown to be reasonable.
- There are no surface stations in the region where the highest AOD's were noted by DiGirolamo. A new AERONOT station has started operating this year in that region.

## Motivation



MODIS January, 2005

- The remote sensing instruments, such as the HSRL, CALIPSO (lidar) and the MISR are in need of ground validation for this part of the world.
- Improved profile and source signatures could lead to better retrieval of aerosol optical depths from remote sensing.
- The region is marked by low valley and fog is a dominant part of the winter time climate. Aerosol generation and its lifetime in a fog dominated environment is a unique feature of this valley.
- NCEP data shows very light winds during the high AOD episodes in this region. However very little is known about the potential mountain-valley circulations and its effect on generating and dissipating these event.

## *Proposed Study*

### ■ PHASE I

- Primarily a scoping study in collaboration with any planned ongoing experiments.
- Ground based measurements of aerosols and meteorological observations.
- Add instrumentation to existing AERONET sites (Kanpur, Gandhi College) for a 3-6 week period and locate one additional station further to the east.
- Identify potential partners in India (DST and Universities).
- Identify and develop contacts with other Agencies interested in the study.
- Explore the potential for using existing INDO-US cooperative agreements on Energy and Environment to sponsor the field experiment.

### ■ PHASE II

- A regional scale study close to the source region.
- Surface data collection, aircraft measurements, balloons and the ARM mobile facility.
- Model forecasts for flight planning
- Other US agencies and a large Indian participation
- Measurement of aerosol fluxes into and out of this region and over onto the Indian Ocean.
- Source characterization using mobile measurements from air and surface
- Profile measurements to measure the effect of fog on aerosol production and removal

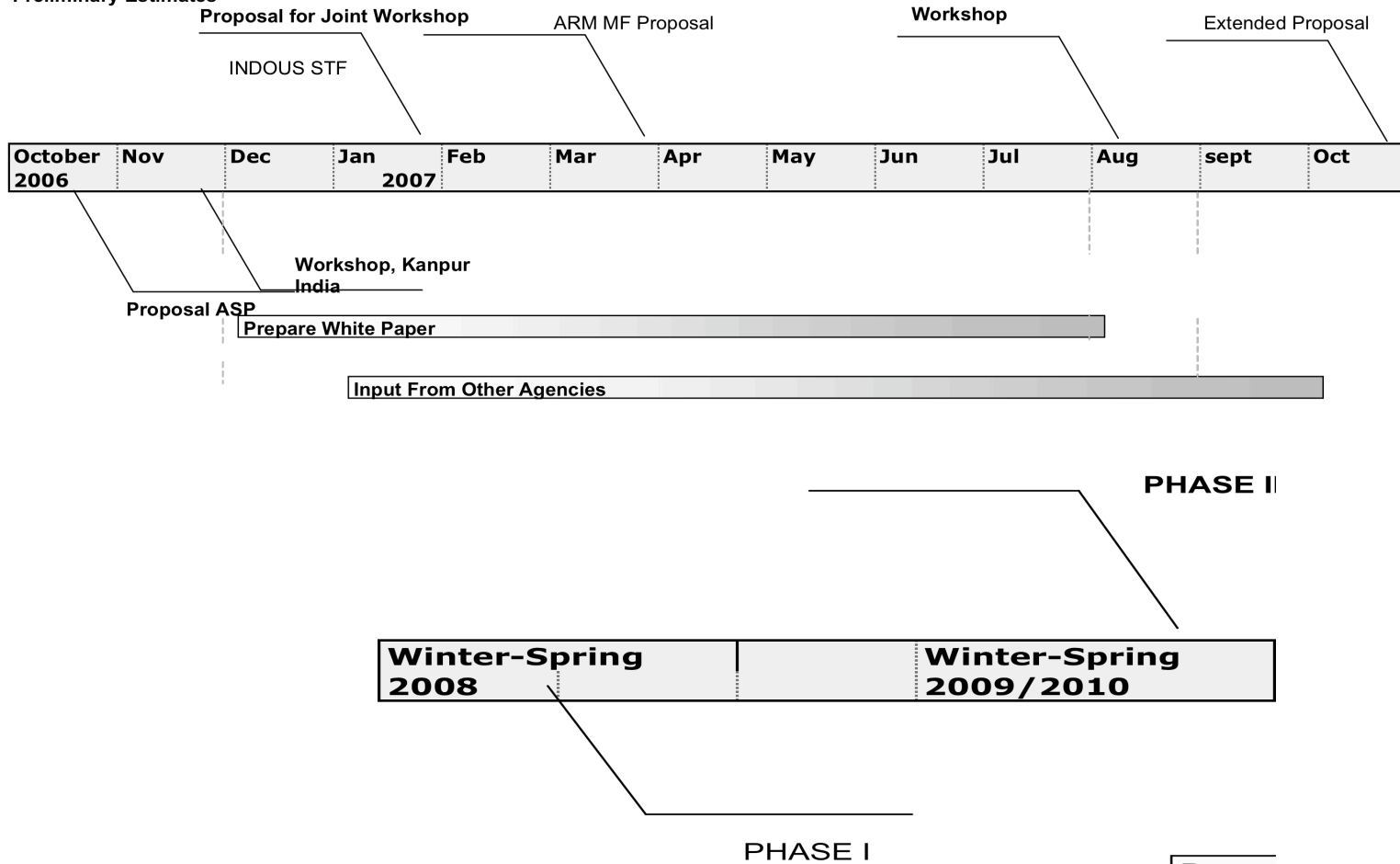


# Project Timelines

GVAX

Project Schedule

Preliminary Estimates



## Potential Collaborators

Department of Science and Technology (Dr. Srinivasan, Director)	India
IIT - Kanpur (Prof. Ramesh Singh, Sachi Tiwari)	India
Indian Institute of Tropical Meteorology ( Dr. S. Singh)	India
Larry DiGirolamo Jeff Gaffney/Nancy Marley	UI-UC UALR
Georg Grell and Steve Peckham	NOAA
Larry Kleinman Rahul Zhaveri	BNL PNNL
Hanwant Singh Holben (India-workshop)	NASA
S. Madronich	NCAR